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PHENOLOGICAL AND POMOLOGICAL CHARACTERISTICS OF *Rosa canina* L. SPECIES CULTIVATED AND NATURALLY DISTRIBUTED IN AMASYA PROVINCE

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Abstract: The aim of this study was to investigate the phenological and pomological characteristics of *R. canina* species cultivated and naturally distributed in Amasya province. *Rosa canina* is one of the important plants distributed worldwide and used in food, medicine, raw materials, and landscaping. The research was carried out in 2022 using cultivated and naturally growing rosehip plants and their fruits in Suluova (Bayırlı Village and Yüzbeyi Village) and Taşova (Esençay Village and Kırkharman Village) districts of Amasya province. The phenological characteristics of the species were observed between April and December. The height (cm), average crown width (cm), and number of branches were measured from north-south and east-west directions of the natural and cultivated rosehip species; the number of fruits and fruit weight of the fruits sampled from 10 individuals were measured by weighing them on a precision balance. The thorniness of the natural and cultivated rosehip plants selected in each location in the study was scored as Very; 3, Moderate; 7, Less; 10. According to the findings, the most significant difference between naturally grown rosehip and cultivated rosehip plants in terms of phenological periods is the ripening time of the fruits. Plant height varied between 180.10±11.94 - 78.00±8.45 in cultivated *R. canina* species and between 119.50±56.34 and 89.00±50.43 in wild species. Crown width ranged between 288.90±12.35 cm and 89.40±2.23 cm in cultivated individuals and between 146.10±7.38 cm and 123.20±7.30 cm in wild species. The number of branches was found between 14.70±4.39 and 6.20±1.22 in cultivated individuals and between 11.20±4.36 and 8.70±5.81 in wild individuals. The study, it was observed that the thorniness was low or moderate in all cultivated rosehip plants. Fruit weight, fruit diameter, and fruit length ranged between 2.29±0.18 and 1.97±0.28; 14.27±0.64 and 12.93±0.59; 20.27±0.80 and 20.10±1.42 in wild *R. canina* individuals, respectively. In cultivated *R. canina* species, fruit weight, fruit diameter, and fruit length ranged from 3.48±0.12 to 2.61±0.28; 17.21±0.85 to 15.53±0.97; 26.65±0.85 to 20.16±0.72, respectively. Fruit weight and fruit diameter of cultivated and wild rose hips were statistically different in different locations.

Keywords: *Rosa canina* L., Phenology, Fruit characteristics, Culture, Wild, Amasya

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1. Introduction

Türkiye, which is rich in biodiversity, is among the leading countries in the world in terms of accessibility to medicinal and aromatic plants that can cure diseases. One of these plants is *Rosa canina* species. It is known that rosehip plant, which is an important medical and economic plant, has been used by many civilizations for thousands of years. Rosehip has a wide distribution almost worldwide (Çelik, 2007). There are 27 *Rosa* spp. species in Türkiye. It also grows in provinces with different climate and soil characteristics, such as Erzincan, Erzurum, Bitlis, Van, and Hakkâri in the Western Black Sea region and Eastern Anatolia, where the harsh continental climate prevails (Güleryüz and Ercişli, 1996). Among rosehip species, *R. canina* is one of the most suitable species for processing in terms of its distribution and fruit characteristics (Anşin and Kılınç, 1996; Öz, 2016). The fruits of rosehip species are very important criteria in selection studies (Arslan et. al., 1996).

Although the local name of the species is commonly known as rosehips, it is also known by different names such as Yabangülü, Civil, Gül burnu, Gül elması, Şillan, Asker gülü, and Deligül. These plants are resistant to harsh environmental conditions (rocky and sloping terrain, poor soiland lack of water). It is a plant that can grow in a wide altitude range of 30-2500 m, especially on rocky slopes in forest openings. In our country, it grows both in cultivated form and in natural environment under different geographical conditions (Yılmaz and Ercişli, 2011; Öz, 2016; Tolekova et al., 2020). As a result of the expanding product range, it is seen that our low-income farmers can obtain an important source of income from rosehip cultivation (Encü, 2015).

When rosehip oil is analyzed, 97 different chemicals; organic acids, saturated fatty acids, natural sugars, phenolic substances, carotenoids, etc. are found (Nowak 2005; Ahmad and Anwar 2016). Rosehip is used as a

valuable raw material in the food and pharmaceutical industries in many countries. It is used in the production of baby foods, tea, jam, marmalade, rose water, rose oil, and fruit juice and in the enrichment of various fruit and vegetable juices in terms of vitamins (Güneş and Şen, 2001a; Uggla et al., 2003; Engin and Boz, 2019).

Thanks to the abundant amount of ascorbic acid it contains, rosehip significantly increases body resistance against flu, colds, colds, and febrile diseases (Güleryüz and Ercişli, 1996). It is known to be effective against diabetes and used as a strengthening agent. Its seeds are used due to its soothing effect (Baytop, 2004). It is also known that it is frequently used in the treatment of diabetes, kidney disorders, inflammation, cancer, heart diseases, colds, psoriasis, stomach pain, hypertension, ulcer and asthma diseases, and stomach and intestinal gases (User, 1967; Chrubasik et al., 2008; Ghazghazi et al., 2012; Oyedemi, et al., 2016).

Especially the recent studies reveal that it can inhibit the proliferation of cancer cells and can be used in cancer treatment (Cagle et al., 2012). In addition, Önal and Oruç (2012) reported in a study that it can be used in fabric dyeing and as a source of natural raw materials in the field of textiles.

Studies conducted in experimental animals stated that rosehip seeds can be added to the foods of dieting people because they reduce cholesterol and triglyceride levels (Öz, 2016). It has been reported that *R. canina* has a strong antimicrobial effect against certain microorganisms (Horváth et al., 2012; Rovná et al., 2020).

R. canina fruits have an important place among forest secondary products. Rosehip plant has a very important place in protecting and forming biodiversity. Thanks to its roots that go deep and spread to the surface and its wide crown, it both increases the soil's water retention capacity, prevents soil erosion and provides habitat for other plants and animals (Yılmaz, 1996). It is also important for wildlife to not shed its leaves until the fall. While its fruits and leaves provide food for some animals, its shrub form provides shelter for some animals. It is important to ensure that rose hips, which are so ecologically and economically valuable, spread to larger areas through planting and cultivation. It is also very important to spread the rosehip plant through planting and planting after breeding in order to produce better quality rosehip fruits (Karakaya, 2016).

The aim of this study was to investigate the phenological and pomological characteristics of *R. canina* species which are cultivated and naturally distributed in Amasya province.

2. Material and Methods

2.1. *Rosa canina* L. (Rosehip)

Rosehip plant, which belongs to the Rosaceae family, is included in the genus *Rosa*. The rosehip plant, which has an upright shrub or climbing form, is a perennial plant that can reach 3.5 m in height, its root goes quite deep, and its branches are densely structured. The stem and branches are curved back, and most species are thorny. The thorns are hook-shaped. The leaves are about 3 cm long; they consist of 5.7 leaflets and usually have saw-toothed margins. Leaves are egg-shaped or elliptical and usually bluish or dull green. Flowers are solitary or 2-15 of them together in an umbellate raceme and have an erselic flower structure (Çelik, 2007). Fruits of *R. canina* species are round or egg-shaped, 1-3 cm long, fleshy, bright red (Figure 1). Flowering time is in May-June and July. Sepals fall off after flowering. Fruits ripen in late summer or fall.

Figure 1. Flowers and fruit of the *R. canina* plant.

2.2. Characteristics of the Research Area and Collection of Samples

The research was conducted in 2022 in Suluova (Bayırlı Village and Yüzbeyi Village) and Taşova (Esençay Village and Kırkharman Village) districts of Amasya province using cultivated and naturally grown rosehip plants and fruits (Figure 2). Producers were interviewed for cultivated plants. Accordingly, it was determined that the seedlings of the cultivated plants were purchased and planted from Tokat province in March 2015 within the scope of a project of the Provincial Directorate of Agriculture. Ten individuals were randomly selected in the field, taking care to ensure that the cultivated plants were of the same age. As for the naturally grown rosehip plants, 10 individuals were randomly selected from the

wild rosehip plants located at a maximum distance of 50 m from the mentioned rosehip fields. Each sample was identified by the name of the village from which it was taken. In addition, naturally grown rosehip plants were referred to as 'wild' and cultivated rosehip plants were referred to as 'cultivated' (Figures 3 and 4).

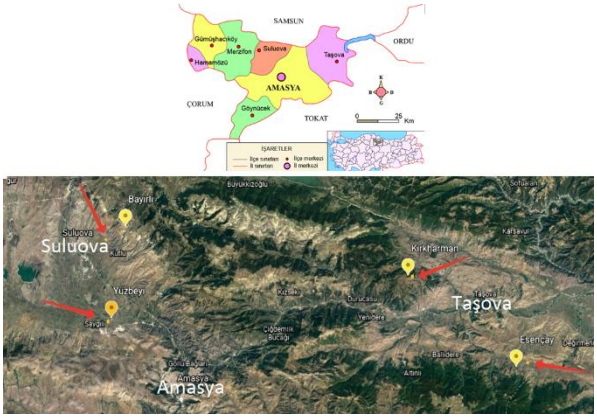

Figure 2. Map of the study areas (Map used from Google maps).

Figure 3. Rosehip plant cultivated in Bayırlı village and dried fruits.

Figure 4. Rosehip plant and fruits growing naturally in Kırkharman village.

2.3. Climatic Characteristics of the Research Area

Located in the interior of the Central Black Sea region, Amasya is in a transition zone between the continental climate and the Black Sea climate. This situation causes the transition climate between the two climates to prevail in Amasya. While winters are not as cold as the continental climate, they are not as mild as the Black Sea climate. Summers are not as rainy as the Black Sea climate and not as dry as the continental climate. Since 1937, the average annual precipitation in the provincial center was 436.7 mm, 458.3 mm in Suluova and 400.0 mm in Taşova. The annual average temperature is 13.6 °C and the annual average relative humidity is 61%.

In 2022, the highest average temperature in Suluova district, where Bayırlı and Yüzbeyi villages are located, was 29 °C in August. The lowest average temperature was 0 °C in February. When we look at the precipitation data, Suluova received the highest precipitation in April with 56 mm. The lowest precipitation was 5 mm in August. In May, when the rosehip plant is thought to need water the most, 46 mm of precipitation fell (Url1).

According to the precipitation and temperature values of Taşova district, where Kırkharman and Esençay villages are located, the highest average temperature was 29 °C in July and August. The lowest average temperature was 2 °C in January and February. When precipitation data is analyzed, the highest precipitation in 2022 was 52 mm in March and December, while the lowest precipitation was

5 mm in August. It was observed that 34 mm of precipitation fell in May, when the water demand is thought to be the highest (Url 2). The total amount of precipitation received by Suluova and Taşova districts in 2022 was measured as 411 mm and 438 mm, respectively.

2.4. Phenological Observations

The phenological characteristics of the species were observed monthly from April to December 2022. The necessary measurements were made with a ruler, and the observations and measurements were recorded in the observation table. Phenological development periods were determined according to Leon-Bertiller (1982). Phenological data were presented by giving maximum and minimum limits.

2.5. Morphological and Pomological features

The height (cm), average crown width (cm), and number of branches were measured from north-south and east-west directions of natural and cultivated rosehip species. Fruit weight was determined by measuring healthy fruits from 10 different plants on a precision balance and averaging them (Baloğlu and Bilir, 2020). In addition, fruit width was obtained by measuring the widest part of the fruit diameter, and fruit length was obtained by measuring the length between the top and bottom of the fruit (Sağır, 2010). Fruit length and fruit diameter measurements were made with calipers.

2.6. Thorniness in rosehip plants

R. canina is a thorny shrub. Thorniness is of great importance especially during rosehip harvesting. In the research, the thorniness of the natural and cultivated rosehip plants selected in each location was rated as Very; 3, Moderate; 7, Less; 10. The thorniness of the species was determined by examining other rosehip plants with the naked eye and comparing them (Güleryüz and Ercişli, 1996).

2.7. Statistical Analysis

SPSS 22 package program was used for statistical analysis of the data obtained. Tukey's multiple comparison test was used to determine the reasons for the differences between naturally grown and cultivated rosehip plants in different locations and One-Way Analysis of Variance (ANOVA) was used to evaluate the differences of both species.

3. Results and Discussion

3.1. Phenological Findings

Phenological observations of rosehip plants in the determined locations are given in Table 1.

In terms of phenological periods, the most prominent difference between naturally grown rose hips and cultivated rose hips is the ripening time of the fruits. While the fruits of wild wild rose hips ripen in September, the fruits of cultivated rose hips, especially in Suluova, ripen in early August. Another difference occurs at the end of the dormancy period and the opening of the first leaf. Again, in rosehip plants cultivated in Suluova, dormancy ends in April and the emergence of the first leaf, which is the first step of vegetative development, occurs. Apart from this, dormancy ends in May and the first leaf emergence occurs in May in natural rosehip plants in all locations examined and in cultivated rosehip plants cultivated in Taşova (Table 1).

Table 1. Phenological developmental stages of rosehip plants (Leon-Bertiller, 1982)

Phase	Months							
	Bayırlı Natural	Bayırlı Culture	Yüzbeyi Natural	Yüzbeyi Culture	Kırkharman Natural	Kırkharman Culture	Esençay Natural	Esençay Culture
Emergence of the first leaf	May	May	May	May	May	May	May	May
Early vegetative development	May	May	May	May	May	May	May	May
Intermediate vegetative development	May	May	May	May	May	May	May	May
Late vegetative development	May	May	May	May	May	May	May	May
Flower Period								
Development of the flower axis	May	May	May	May	May	May	May	May
Bud growth	May	May	May	May	May	May	May	May
Ripening of flowers	June	June	June	June	June	June	June	June
Fruit Period								
Fruits are green	July August	July	July August	July	July	July	July	July
Fruit ripening	September	August	September	August	September	September	September	September
Vegetative stagnation	November	November	November	November	November	November	November	November
Onset of Aging	November	November	November	November	November	November	November	November
Old age (defoliation)	December	December	December	December	December	December	December	December
Dormansi	January February March April	January February March	January February March April	January February March	January February March April	January February March April	January February March April	January February March April

In other studies, it was reported that the flowering of *R. canina* lasted from late April to May and early June (Gyan and Woodel 1987; Türkben et al., 1999; Ekincialp, 2007). On the other hand, Kutbay and Kılınç (1996) reported that flowering time was between 5th-7th months. They reported that it was between 5th and 7th months. Dölek (2008) reported that the flowering period is in the 5th and 6th months, fruit ripening is in the 9th month, and the species sheds its leaves at the end of November. Fruit ripening is between August and September (Ekincialp, 2007). Different phenological data were obtained in the studies of other researchers (Kühn, 1992; Yılmaz, 1996; Güneş et al., 2017)

Although the phenological characteristics of *R. canina* species in the study area are in accordance with the findings of other researchers, the phenological characteristics of the species may vary according to climate, soil, and environmental conditions.

3.2. Morphological and Pomological Findings

Plant height varied between 180.10±11.94 -78.00±8.45c in cultivated *R. canina* species and between 119.50±56.34 and 89.00±50.43 in wild species (Table 2). It has been reported that the height of *R. canina* species varies between 2 and 3.5 m (Ercişli 2005; Demir and Özcan 2001; Javid et al., 2021; Dölek 2008).

Plant height is an important factor in increasing the plant's fruit yield. First of all, when we compare the naturally grown and cultivated rosehip plants, it is seen that there is a difference according to the localities. In Yüzbeyi and Bayırlı villages, cultivated rosehip plants were significantly superior to naturally grown rosehip plants. In Esençay and Kırkharman villages, on the other hand, the height of cultivated plants lagged behind naturally grown rosehip plants in terms of height (Table 2).

It is thought that this situation is due to the fact that the farmers producing rose hips in Esençay and Kırkharman do not pay the necessary attention to plant care. In the naturally grown rosehip plants, it is seen that Yüzbeyi and Bayırlı villages located within the Suluova district border are superior in terms of height. It is assumed that the reason for this situation may be due to the climatic differences of the two districts.

When we examined the plant height of rose hips according to natural and cultivated cultivation independent of localities, it was determined that cultivated rose hips plants were superior to naturally grown rose hips plants. While cultivated rosehip plants have the advantage of plant care such as watering the plant, meeting fertilizer needs, and controlling weeds, naturally grown rosehip plants lack these advantages. However, it was observed that cultivated rosehip plants do not have the same degree of plant care in every location.

Crown width was found between 288.90±12.35 cm and 89.40±2.23 cm in cultivated individuals and between 146.10±7.38 cm and 123.20±7.30 cm in wild species.

Crown widths of 3-year-old *R. canina* species distributed in Erzican were reported to be between 30-330 cm (Kızılcı, 2005), which is consistent with our study. Dölek (2008) reported crown width as minimum 1.2 m and maximum 3.9 m in his study conducted in Amasya. Crown width is the most important indicator of how wide the plant can spread. Fruit yield increases in plants that spread over a wide area. When we evaluated the crown width in terms of locations, it was determined that the widest crown width was found in rosehip plants cultivated in Yüzbeyi village (Table 2). Similarly, the crown width of cultivated rosehip plants grown in Bayırlı village, which is also located in the same district, ranked second. No significant difference was found between the crown lengths of naturally grown rosehip plants on the basis of locations.

The number of branches ranged from 14.70±4.39 to 6.20±1.22 in cultivated individuals and from 11.20±4.36 to 8.70±5.81 in wild individuals (Table 2).

When the number of branches of rosehip plants was examined, it was seen that the plants with the highest number of branches were cultivated rosehip plants in Bayırlı village. In other localities, rosehip plants cultivated in Yüzbeyi village ranked second.

Table 2. Plant height, crown width and number of branches of *R. canina* species according to localities and Tukey HSD Results (Cultivated and Natural values in the same column with different letters are different from each other at P<0.05 level)

Locality	n		Plant height (cm)	Plant height (cm)	Plant height (cm)	Plant height (cm)
Yüzbeyi	10	Wild	104.50±67.28^{a}	134.40±67.65^{a}	8.70±5.81^{a}	Very Spiny
Esençay	10	Wild	90.40±43.79^{a}	123.20±73.02^{a}	10.10±4.88^{a}	Very Spiny
Bayırlı	10	Wild	119.50±56.34^{a}	146.10±73.87^{a}	11.20±4.36^{a}	Very Spiny
Kırkharman	10	Wild	89.00±50.43^{a}	128.90±86.63^{a}	10.00±5.73^{a}	Very Spiny
Yüzbeyi	10	Culture	154.30±9.32^{b}	288.90±123.59^{a}	11.00±5.20^{a}	Less prickly
Esençay	10	Culture	80.90±12.48^{c}	89.40±22.35^{b}	6.20±1.22^{c}	Medium prickly
Bayırlı	10	Culture	180.10±11.94^{a}	261.50±88.06^{a}	14.70±4.39^{a}	Less prickly
Kırkharman	10	Culture	78.00±8.45^{c}	97.20±22.83^{b}	8.00±2.16^{b}	Medium prickly

It is especially noteworthy that rosehip plants cultivated in Esençay have the lowest number of branches in the graph. In terms of the number of branches in rosehip plants, plant care comes to the forefront again. In the observations we have made, it is revealed that the cultivated rosehip plants in Bayırlı village, which are in the best condition in terms of plant care, show better development in every aspect, while the cultivated rosehip plants in Esençay village, which are very inadequate in terms of plant care, cannot show sufficient development. It is seen that there is no significant difference in terms of the number of branches in rosehip plants growing naturally in different localities. Baloğlu and Bilir (2020) found the average number of branches to be 17 in a study conducted in Burdur.

The thorniness of the plant is among the important factors in the breeding studies of rosehip species (Ercişli, 1996; Güneş and Şen, 2001b; Çelik, 2007; Akkuş, 2016). In the study, it was observed that the thorniness of all cultivated rosehip plants was "low" or "medium" (Table 2). Especially the rosehip plants cultivated in Suluova were found to have very "low" thorniness. Thorniness was noted as "very" in all samples examined in naturally grown rosehip plants. Low thorniness appears to be a great advantage that will facilitate the collection of rosehip plants, especially during harvesting. Yıldız " identified 4 types of rose hips (*R. canina*) species as less thorny, 4 types as medium thorny and 3 types as very thorny out of 11 types (Güneş et al., 2017). Akkuş (2016) recorded *R. canina* species as low, medium and very spiny. A study conducted in Hakkari province reported thorniness as very thorny in 11 genotypes, medium in 35 genotypes, and low in 4 genotypes (Ekincialp and Kazankaya 2012). In a study conducted in and around Bolu province, Özen (2013) found that half of the 9 different genotypes studied were less spiny.

In wild *R. canina* individuals, fruit weight, fruit diameter, and fruit length varied between 2.29±0.18 and 1.97±0.28; 14.27±0.64 and 12.93±0.59; 20.27±0.80 and 20.10±1.42, respectively. In cultivated *R. canina* species, fruit weight, fruit diameter, and fruit length ranged from 3.48±0.12 to 2.61±0.28; 17.21±0.85 to 15.53±0.97; 26.65±0.85 to 20.16±0.72, respectively. Fruit weight and fruit diameter of cultivated and wild rose hips were statistically different in different locations.

When Table 3 is examined, it is seen that the highest fruit weight is in the fruits of cultivated rosehip plants grown in Bayırlı village, but the fruit weights of cultivated rosehip plants in all locations are higher than the weight of naturally grown rosehip fruits. Producers' preference for improved rosehip plants while selecting the seedlings to be cultivated plays an important role in this situation. When the fruit diameter values were analyzed, it was observed that a situation similar to fruit weight emerged (Table 3). The diameters of cultivated rosehip fruits were superior to those of naturally growing rosehip plants in all localities. Among the cultivated rosehip fruits, the diameter of the rosehip fruits growing in Bayırlı village reached the highest level, again suggesting that the adequate plant care was carried out. When we evaluated *R. canina* species in terms of fruit length; the lengths of the fruits collected from cultivated rosehip plants in Yüzbeyi and Bayırlı villages were the highest (Table 3).

Based on these data, we can conclude that cultivated *R. canina* species have larger fruit weight, diameter, and length than wild species. This difference can be explained by cultivated plants growing in better conditions and having more nutrient resources.

Kazankaya et al. (2001) determined that the fruit diameter was between 10.80 mm-17.06 mm and the fruit length was between 17.86 mm-29.50 mm in their study on rosehip plants growing naturally in Adilcevaz. In a study conducted in Nizharadze (1971) found that the fruit length was 19.3 mm. This study also supports the values we determined especially in the natural environment. In a study conducted in Tokat, fruit weight was reported as 2.15-2.90 g (Güneş et al., 2017).

Again, Özen (2013) reported that the fruit lengths of rosehip genotypes taken in the study conducted in the central district of Bolu varied between 13.28 mm-25.37 mm and fruit diameter between 9.33 mm-15.88 mm, which is in parallel with the findings obtained in our study.

Table 3. Results of fruit weight, fruit diameter, fruit length, and multiple comparison test (Tukey HSD) of *R. canina* species according to localities (Wild and cultivated values in the same column with different letters are different from each other at P<0.05 level)

Locality	n		Fruit weight (g)	Fruit diameter (mm)	Fruit length (mm)
Yüzbeyi	10	Wild	2.29±0.18^{a}	14.27±0.64^{a}	20.27±0.80^{a}
Esençay	10	Wild	2.05±0.08^{b}	13.28±0.52^{b}	20.16±0.72^{a}
Bayırlı	10	Wild	1.97±0.28^{b}	13.14±0.40^{b}	20.16±0.72^{a}
Kırkharman	10	Wild	1.99±0.15^{b}	12.93±0.59^{b}	20.10±1.42^{a}
Yüzbeyi	10	Culture	3.21±0.13^{b}	15.71±0.56^{b}	26.65±0.85^{a}
Esençay	10	Culture	2.61±0.28^{c}	16.34±1.18^{a}	20.16±0.72^{a}
Bayırlı	10	Culture	3.48±0.12^{a}	17.21±0.85^{a}	26.38±0.82^{a}
Kırkharman	10	Culture	2.77±0.22^{c}	15.53±0.97^{b}	23.28±1.70^{b}

Table 4. ANOVA test table of rosehip plants according to the locality where it grows and whether it is wild or cultivated (**P<0.01, *P<0.05)

	Parameters	F Value	P Value
Locality	Plant height	13.686	0.00**
	Crown length	10.987	0.00**
	Number of branches	4.321	0.01**
	Fruit weight	24.860	0.00**
	Fruit diameter	5.821	0.00**
	Fruit length	34.097	0.00**
Wild* Culture	Plant height	6.405	0.01**
	Crown length	8.903	0.00**
	Number of branches	0.001	0.98ÖD
	Fruit weight	447.314	0.00**
	Fruit diameter	271.739	0.00**
	Fruit length	276.844	0.00**
Locality *Wild *culture	Plant height	4.589	0.01**
	Crown length	8.209	0.00**
	Number of branches	3.020	0.04*
	Fruit weight	20.612	0.00**
	Fruit diameter	10.322	0.00**
	Fruit length	27.037	0.00**

In a study conducted in Siirt, fruit widths ranged between 10.08-15.63 mm and fruit lengths ranged between 15.00-24.55 mm in the samples taken in the first year, and fruit widths ranged between 10.12 mm-15.36 mm and fruit lengths ranged between 17.40 mm-25.29 mm in the samples taken in the second year (Yörük, 2006). In a study conducted in Ordu province, fruit weight was reported as 1.22-3.47 g, fruit width 10.2-16.9 mm, fruit length 13.2-25.2 mm (İpek and Balta 2020).

Although these results are in parallel with our findings, the lower limit of the given values is close to the values of rosehip fruits grown in the natural environment in our study, while the upper limit of the given values is close to the values of the fruits of cultivated rosehip plants in our study.

3.3. ANOVA Results

The following findings were found in the results of one-way analysis of variance (ANOVA) according to the localities where rosehip plants were grown. Differences in plant height, crown width and number of branches were significant according to the localities. In rosehip fruits, differences in fruit weight, fruit diameter and fruit length were significant (Table 4).

In the one-way analysis of variance (ANOVA) results according to whether the rosehip plants were wild or cultivated, it was observed that the difference in plant height and crown width were significant, while the difference in the number of branches was not significant. In rosehip fruits, differences in fruit weight, fruit diameter, and fruit length were significant.

4. Conclusion

In this study we conducted in Suluova and Taşova districts of Amasya province; when we first compare the morphological characteristics of cultivated rosehip plants and naturally grown rosehip plants, it is seen that there is an advantage in favor of rosehip plants cultivated by producers especially in terms of the length of rosehip plants. As a result of a five-year development process, cultivated rosehip plants were found to be taller than naturally grown rosehip plants. A similar situation is also observed in crown length.

When compared in terms of fruit size, it was observed that the average fruit width of naturally grown rosehip plants was 10 mm and the average fruit length was 17 mm, while the average fruit width of cultivated rosehip plants was 16.5 mm and the average fruit length was 22.75 mm. In terms of fruit weight, it was determined that the fruit weights of cultivated rosehip plants were higher especially in Yüzbeyi and Bayırlı villages. Higher fruit weight will provide a great advantage for the producers, increasing the total annual yield.

Although the wild rosehip plant grows widely in our country and its nutritional value has been better understood especially in recent years, there has not been enough progress in cultivation and breeding studies. Although there is a high demand for rosehip seedlings from both public and private nurseries, it is insufficient to meet the need. In order to meet the demand for quality rosehip seedlings, it should be ensured to select and breed the best types from the wild rosehip population by selection and then to meet the demand by multiplying these types in nurseries (Güneş and Şen, 2001a).

Its aesthetic and economic value will make it possible to further increase the areas of use of rose hips. In addition, the establishment of a rosehip processing industry in the regions where it is produced intensively will further strengthen the economic value of rosehip. Today, rose hips are produced and cultivated by using rosehip seedlings produced by breeding through selection from

rosehip plants that grow naturally, albeit in limited areas, and there are small-scale industrial organizations that process the rosehip fruits produced (Koçan, 2010). Rosehip fruits are rich in many vitamins and minerals. It is one of the richest fruits especially in terms of vitamin C. Studies have concluded that 1 kg of rosehip fruit contains approximately 500 mg of vitamin C (Arslan et al., 1996). Due to these features, expanding the cultivated cultivation of rose hips is very important.

Our study is a rare study in terms of revealing the difference between naturally grown rose hips and cultivated rose hips. In similar studies to be conducted in the future, the soil structure, the amount of water needed and the irrigation period of rosehip can be investigated.

Author Contributions

The percentage of the author(s) contributions is presented below. All authors reviewed and approved the final version of the manuscript.

	F.D.	D.D.K.
C	50	50
D	50	50
S	50	50
DCP	60	40
DAI	40	60
L	50	50
W	50	50
CR	50	50
SR		100
PM	10	90

C=Concept, D= design, S= supervision, DCP= data collection and/or processing, DAI= data analysis and/or interpretation, L= literature search, W= writing, CR= critical review, SR= submission and revision, PM= project management.

Conflict of Interest

The authors declared that there is no conflict of interest.

Ethical Consideration

Ethics committee approval was not required for this study because of there was no study on animals or humans.

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